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ABSTRACT

The goals of liberal education are to deepen the understanding of the nature of humankind and of the human condition. In the last half century, fundamental changes have occurred in perceptions of how the human species relates to the rest of the universe, due to developments in science and the creation of the cognitive sciences. There is now the danger that even the best liberal education will focus too narrowly on the humanities and ignore science as irrelevant. The cognitive sciences could help create a new curriculum in which natural science plays an essential role because cognitive sciences: (1) have numerous deep ties with both the natural sciences and the humanities; (2) are young enough to be more easily influenced to play an important educational role than other, more established sciences; and (3) demand significantly less specialization and are more accessible to undergraduates than the traditional sciences. Linguistics already has a theoretical framework more sophisticated than any other cognitive science and has a highly articulated, well-defined subject area in language. Imaginatively conceived courses on language and linguistic theory could begin and sustain necessary changes in our conception of what is normal in a liberal education. (Author/MSE)

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LINGUISTICS IN THE UNDERGRADUATE CURRICULUM

APPENDIX 4-H

Linguistics, Cognitive Science and Liberal Education

by

Frank Heny

The views expressed are those of the authors and do not necessarily reflect the position of the LSA or the National Endowment for the Humanities.

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PREFACE

The Linguistics in the Undergraduate Curriculum (LUC) project is an effort by the Linguistic Society of America (LSA) to study the state of undergraduate instruction in linguistics in the United States and Canada and to suggest directions for its future development. It was supported by a grant from the National Endowment for the Humanities during the period 1 January 1985-31 December 1987. The project was carried out under the direction of D. Terence Langendoen, Principal Investigator, and Secretary-Treasurer of the LSA. Mary Niebuhr, Executive Assistant at the LSA office in Washington, DC, was responsible for the day-to-day administration of the project with the assistance of Nicole VandenHeuvel and Dana McDaniel.

Project oversight was provided by a Steering Committee that was appointed by the LSA Executive Committee in 1985. Its members were: Judith Aissen (University of California, Santa Cruz), Paul Angelis (Southern Illinois University), Victoria Fromkin (University of California, Los Angeles), Frank Heny, Robert Jeffers (Rutgers University), D. Terence Langendoen (Graduate Center of the City University of New York), Manjari Ohala (San Jose State University), Ellen Prince (University of Pennsylvania), and Arnold Zwicky (The Ohio State University and Stanford University). The Steering Committee, in turn, received help from a Consultant Panel, whose members were: Ed Battistella (University of Alabama, Birmingham), Byron Bender (University of Hawaii, Manoa), Garland Bills (University of New Mexico), Daniel Brink (Arizona State University), Ronald Butters (Duke University), Charles Cairns (Queens College of CUNY), Jean Casagrande (University of Florida), Nancy Dorian (Bryn Mawr College), Sheila Embleton (York University), Francine Frank (State University of New York, Albany), Robert Freidin (Princeton University), Jean Berko-Gleason (Boston University), Wayne Harbert (Cornell University), Alice Harris (Vanderbilt University), Jeffrey Heath, Michael Henderson (University of Kansas), Larry Hutchinson (University of Minnesota, Minneapolis), Ray Jackendoff (Brandeis University), Robert Johnson (Gallaudet College), Braj Kachru (University of Illinois, Urbana), Charles Kreidler (Georgetown University), William Ladusaw (University of California, Santa Cruz), Ilse Lehiste (The Ohio State University), David Lightfoot (University of Maryland), Donna Jo Napoli (Swarthmore College), Ronald Macaulay (Pitzer College), Geoffrey Pullum (University of California, Santa Cruz), Victor Raskin (Purdue University), Sanford Schane (University of California, San Diego), Carlota Smith (University of Texas, Austin), Roger Shuy (Georgetown University), and Jessica Wirth (University of Wisconsin, Milwaukee).

Introduction: Contemporary Education

Linguists have not done very much professional wondering about education. Until quite recently most would have claimed that the field had little to offer at the undergraduate level, and I have no doubt that there are many of us in linguistics who still have a sneaking feeling that the **real** linguist does research, and to the extent necessary teaches graduates, and has little worthwhile to say to undergraduates, useful as they are to have around in order to justify FTEs. I want to try and help you see that we really do have a great deal to offer undergraduates. In return, I am sure that if we take undergraduate education seriously then this will benefit linguistics -- but I should be honest: it is undergraduates rather than linguists whose interests concern me most deeply. Look at it any way you will, we need an effective way of educating college graduates more urgently than we need the results of linguistic research.

I am going to spend a lot of this paper dealing with general goals, and very little time on practicalities. This will be necessary if we are to appreciate the context in which we as linguists (more generally as cognitive scientists) can now contribute to contemporary education.

The American ideal, from the outset, demanded that the colleges of this country prepare all those who passed through them for full participation in democracy. In a society supposedly committed to equal opportunity, it is the colleges above all that must be held responsible for passing on the traditions and values of society to those who might not otherwise acquire them. College prepares the young adults for life, not merely by providing vocational training to the leaders of society, but by engaging the students in all manner of activities which can make them more effective members of a democratic society. On the whole, the American colleges have done an admirable job, over the centuries, preparing generation after generation to live effectively in a changing and often turbulent world. There is, in other words, a tradition of liberal education in the country. Admittedly, until relatively recently, access to a college education was not really open to the masses, but the concern has been there, the ideals, the education itself, for those who made it through that far, and with the vast expansion of higher education in recent years the educational system is trying very hard to translate high ideals into a practical education that is at least a little more than just advanced vocational training.

It is rather generally admitted that the system is not succeeding too well. There are many reasons. Perhaps the most serious, and certainly the least commonly recognized, is the fact that those who are generally assumed to be most responsible for passing on what we have inherited from the past are remarkably ill-equipped to understand the nature of that which they must pass on. For, by and large, the professional educators in our society have been trained in such a way that they are cut off from much of what is most vital in our culture. They, and we, more often than not fail even to recognize as a part of our culture aspects of our heritage which lie quite near the core. "Culture" is the business of those who look back, or those who create within some artistic medium. With little more than a passing thought, we simply take for granted that it is our colleagues in the "humanities" who are the guardians of our heritage: the historians, the philosophers, the literary scholars, the curators of museums, contemporary artists, musicians, writers. These are the ones whose professional concern it is to pass on the baton. Other scholars may be called in from time to time for a little assistance. Scientists, particularly social scientists, are expected to lend a hand in broadening the base of education but the true educators are those humanists who are steeped in the past, concerned directly with philosophical, especially moral, debate or engaged in artistic creation of some kind.

It would be pointless to deny the importance of the traditional humanities in a liberal education. I have no intention of doing that. The importance of the accepted subject areas goes without saying. My point is simply that the humanities in this limited sense constitute only a small fragment of the culture which we have inherited: there is a vast, challenging, and highly relevant part of that culture whose humanistic significance goes unrecognized and whose educational resources remain virtually untapped. The heart of our culture today is science. It is the scientific world-view that molds every aspect of our lives. Like it or not, scientific ways of thought lie at the heart of every thing we do every moment of the day. Ignore that if we will, we can't escape it. And since it is this scientific world-view that now dominates our civilization, we cannot consistently ignore it in our attempts to provide a liberal education to the young. Indeed, it is scientific education (in a special sense) that must now form the core of a liberal education! What I mean by this will form the main topic of this talk.

The goals of education are clear: to deepen our understanding of the nature of humankind and of the human condition. During the last half century or so, fundamental changes have occurred, above all in how we relate the human species to the rest of the universe of which it is a part. These changes in our perception have come about through developments in science -- in particular

through the creation of those sciences which concern themselves specifically with the core properties of the human species: the cognitive sciences. They affect humanity. And should certainly have affected the humanities. Yet the humanities, as we tend to think of them, are concerned with only a small part of what it means to be human, and even the best liberal education today is in danger of focusing on ways of thinking about human nature which ignores science as irrelevant -- to the great impoverishment of contemporary education. A liberal education can no longer be founded solely upon the traditional humanities. Anyone who thinks it can is myopic -- and likely as not to be a professional educator: one may search in vain for serious attempts to incorporate the relevant scientific knowledge and methodology into the central core of American liberal education.

People worry, of course, about the supposed conflict, or gulf, between the sciences and the humanities. But the mere fact that the problem is often stated in those terms indicates a failure to come to grips with the real issues. Concern is wasted on a pseudo-problem. In a world of increasing specialization and complexity there is inevitably tension between a commitment to the ideals of a liberal education and the need for young people to specialize, in preparation for their future careers; and this tension is often seen as a conflict between the Humanities and the Sciences. There is, of course, some reason for this: nowhere is specialization so essential as in the hard sciences and their technological cousins, so students majoring in science and technology will tend to have less time for general education. In addition, they will obviously tend to do less work in the humanities than their counterparts majoring in languages, philosophy and so on, while students whose majors lie in the humanities will necessarily tend to understand less of the scientific viewpoint than will the science majors.

What I am worried about is not this natural and largely inevitable difference in emphasis, but a different, and potentially very serious, problem affecting **all** our undergraduates, including the science majors. College students graduating today -- again including the science majors -- are effectively insulated by the nature of their educational experience from a large part of their cultural heritage. Our civilization rests on science; the ways of thought that we have inherited from the past are in large measure **scientific**; our legacy from the past includes, crucially, the legacy of science. If we are to maintain, and where appropriate develop, a coherent system of values that is consistent with our heritage and our culture, then the central role of science **in that culture** must be recognized. Such recognition has yet to come.

It means far more than just including science courses among distributional requirements or in a "Core Curriculum". It has nothing at all to do with the highly specialized, vocational courses required of science majors. It is not a matter of teaching students about "Great Ideas" from the history of science. It is not even a question of requiring that students take courses in the Philosophy of Science. The accumulated wisdom of the past is not -- most certainly not in the case of science -- a fossilized tradition to be distilled only from museums or from writings from or about the past. It lives in the present. Musical performance, creative writing and courses in studio art are all accepted as a perfectly normal part of a liberal education; surely "doing" science should be, too. At the very core of our self-awareness as humans and members of human society lie, often unrecognized, essentially scientific ways of thought. These ways, like other, more obviously "humanistic" strands, have been with us since at least the city-states of Greece, and are as fundamentally a part of our "culture" as are the moral, legal, and artistic legacy which we similarly inherit from the past. They have simply attained, especially over the past few decades, an overwhelming importance -- which has nevertheless scarcely begun to affect the essential structure of contemporary education.

There are historical reasons for this. Two are especially noteworthy. First, we have, as a society, given scientists little incentive to develop the educational potential of their disciplines. The natural sciences have obviously offered society great material benefits and the material success of their graduates has consequently often depended directly on the degree to which those graduates have managed to specialize from an early age. Thus there has been much pressure on science teachers to engage in what is essentially vocational teaching. Let's face it, a high degree of specialization is necessary in the sciences not merely in order to gain material reward: to advance scientific knowledge, specialization is essential and inevitable. Hence, science students and teachers have had every reason to concentrate on their immediate areas of specialization and not on the broader educational significance of their work. (Clearly this has been true, in part, of linguists during the last three decades.)

The second historical factor tending to reduce the impact of scientific thinking on liberal education is the gap in scientific knowledge which existed, until recently, precisely where one might hope to establish relationships with the humanities: no science has focused appropriately on human nature itself. Psychology, which would have been the natural candidate to provide such links, was, at least in this country, almost entirely behavioristic and anti-theoretical, congenial neither to the natural sciences nor to traditional humanism. Thus, the links between scientific thought and humanism (concerned as it is with human

nature, and the place of humankind in the universe) have not been immediately obvious.

Two quite independent factors have therefore inhibited the development of an approach to liberal education in which scientific thought was given a central role: there are incentives that tend to induce specialization in the sciences, and the distance between scientific research and questions of human nature have until recently been considerable.

As linguists we work in one of a group of sciences which may well hold the key to both problems: effectively employed, the cognitive sciences could help us find our way to new curricula for liberal education in which natural science played an essential role. They have a number of properties that lead me to say this, three of which are especially significant. First, they have numerous deep ties both with the natural sciences and with the traditional humanities. Second, they are young enough to be more easily influenced to play an important educational role than are the older, more established sciences, some at least being currently rather less easily marketable than the older, "natural" sciences. Finally, precisely because of their relative youth, they demand significantly less specialization and hence are far more easily accessible to undergraduates than are the older sciences. Within the cognitive sciences I believe linguistics holds a special place. For reasons that have to do both with subject matter and with the nature of the theoretical framework, it could play a pivotal role in making possible a curriculum in which the cognitive sciences linked the traditional humanities to the natural sciences.

The Cognitive Sciences in Education

Whatever else it may be expected to do, a liberal education is supposed to contribute to the development, in each individual, of her or his full potential as a human being. One might agree that a deep understanding of the scientific outlook is an essential part of what constitutes an "educated person" today, one of the prerequisites for living successfully in the modern world. That could be considered sufficient reason for including serious scientific training in every college education. However, there has always been an element of self-reflectiveness in liberal education, and not without reason: the students are to be helped to a deeper self-awareness. From this point of view there is no doubt that an examination of **human nature** lies at the center of a liberal education, and one perfectly good reason why the sciences have played so

subservient a role in education is that until very recently they were scarcely able to contribute anything directly to our conception of human nature itself. Human nature itself was simply not subject to scientific study. Over the centuries, the sciences have chipped away at our anthropocentric view of the universe, dismantling it piece by piece, and in this way have deeply affected our view of humankind -- but in a largely negative, oblique fashion.

This is where we, along with our colleagues in the other cognitive sciences, come in. Each of these sciences focuses on some aspect of the mental make-up of the human being. Thus it is that they have begun to provide precisely what was missing before: a scientific approach to human nature itself. They differ greatly in the way in which (and degree to which) they apply scientific theory-building to their subject matter. Artificial intelligence, for example, as most of us are rather acutely aware, is far more frequently engaged, today, in solving engineering problems than in attempting to construct general theories. Neurology is a branch of medicine and, as might be expected, is primarily engaged in empirically based problem solving rather than in fundamental theoretical research. (Also, unlike the other cognitive sciences it deals directly with traditional, obviously physical subject matter: the structure of the **brain**, rather than that of the **mind.**) Linguistics, on the other hand, employs quite sophisticated theories, constructing and testing these in a more or less standard fashion to develop a general account of the human language faculty -- even though it scarcely deals at all with the traditional, physical subject matter of natural science.

Whatever the differences between us, though, we are all members of a small community of scientists whose focus of interest is central to human nature -- the mind. The cognitive sciences form a series of natural bridges between the traditionally recognized sciences and the traditional humanities. They will obviously have to play a significant role in any coherent curriculum for a liberal education during the last two decades of this century. Within that general context, I see a special place for linguistics because of the fact that we, as linguists, have available a theoretical framework which is far more sophisticated than that of any other cognitive science, probably as a result of the fact that we deal with an aspect of the mind which yields, as its tangible expression, a more highly articulated, well-defined system than any other: language. Because of this, and because language in turn is so deeply involved in all other aspects of education, we could provide leadership, spear-heading significant changes in the undergraduate curriculum -- a role which I am appealing to you today to assume. Imaginatively conceived courses on language and linguistic theory could initiate and sustain the necessary changes in our conception of what is "normal" in a liberal education.

Linguistics as a Cognitive Science

Most academics have heard something of the revolution in linguistics that occurred in the 1950s, inspired by the work of Noam Chomsky, but virtually no-one outside the field has any clear grasp of what has happened since then: the decade of reasonable but disappointingly slow and uneven progress up to the late sixties; then the ten years of doldrums; and then, very recently, the second revolution under Chomsky's influence -- which I believe to be far more significant than the first -- certainly in its practical implications. The role I am suggesting for linguistics in education is immediately dependent on these recent developments -- though it obviously has its roots in the long tradition of systematic work on language that goes back at least two hundred years. In the rest of this section I will give a very brief account of how I see the field today in so far as recent history affects its potential contribution to education. In doing this I will assume a naive reader, in the hope that to do so may help others think about how to communicate with other academics about what linguists could offer them. I shall adopt my own point of view -- which may well not be shared by all my readers..

The essential premise under which cognitive linguistics has been operating since the fifties is, I believe, this: important aspects of language structure are determined by the structure of the human mind, and in particular those features of mental structure which permit and control the development of language in the normal child. It has become increasingly clear that a child learning a language does so not by imitating, blindly, all that it is exposed to, but by making active use of a highly complex framework which both facilitates language learning and (in doing so) determines what kinds of languages are learned. The structure of the human mind limits, very significantly, the set of possible human languages: only those constructed in conformity with the relevant structural properties of the mind will be developed by a child in the normal course of events. To the extent that linguistic analysis is now beginning to isolate just those central properties of language which result from mental structure in this way, it yields important insights into aspects of that structure. That is, in fact, the central goal of contemporary linguistic theory.

The first twenty years of this research program was dominated by a particular hypothesis about the nature of the central properties of language. That hypothesis was, inevitably, found seriously inadequate. There is nothing unexpected or undesirable in the fact that linguistic theory has undergone radical change in this way. The change was not simply a matter of fashion, or a swing of the pendulum. It was a natural and positive development. As often

happens in a science, the then current theory was replaced by a more adequate framework. The change was quite fundamental. Our conception of what constitutes a language, and our account of how a language develops in the child were both totally changed.

Human languages were represented, in the fifties, sixties, and indeed much of the seventies, like computer languages, as an infinite set of sentences which had certain rather easily defined structural properties. The rules defining the sentences of a given language embodied these interesting structural properties. These rules formed the **grammar** of that language. And the child learning the language had to "discover" that grammar, building up the rules bit by bit on the basis of the data provided by the language it heard -- much as a linguist would do, faced with the task of analyzing it without the benefit of prior descriptions.

The mental structures the child would bring to this task were represented, essentially, as simply principles of grammar construction. The child would unconsciously "expect" to have to analyze its language in terms of constructs like **noun** and **verb**, and certain structural relations between these constructs. In other words, its unconscious "hypotheses" about the structure of its language would have to be formulated using the basic inventory of terms available to it, like **noun** and **verb**, and would also be limited to the permitted structural relations between these basic items. Most important of all, it would "expect", in this same sense, to find certain complex structural relations ("transformational" relations) between sentences. In English the transformational relations the child would find would include the structural relationship between an active sentence, Jane saw Bill and its passive counterpart, Bill was seen by Jane, or that between a statement and its questioned counterpart (Did Jane see Bill? and Was Bill seen by Jane? respectively for these two examples.) The fact that such relationships hold between English sentences, and are "expected" to do so would simplify language learning since the child would not need to discover the basic categories and relations needed to correctly represent these aspects of the structure of the language. Those categories and relations were supposed, instead, to be innate. This explained, it was felt, how it came about that the human child learns language so naturally, fast and well. The "expectations" of the child in this account are nothing more than a fund of analytical categories, including rule-types, which yield appropriate grammars for languages of the kind that human beings learn and use, and which, being innately available to the human infant, determine the kinds of structures that languages exhibit.

The most obvious, and in many ways most serious, problem with this account of language structure was that the "transformational" model could be extended only with difficulty to languages other than English. Even when it was extended,

each language was inevitably viewed as a separate, isolated phenomenon. (I think it is important to emphasize this, since the chances are that if a non-linguist knows anything about the field she or he has had some exposure to the standard transformational grammar of the sixties -- which had little to say about language in general.) If transformational relationships really formed one of the fundamental building blocks of human language, the positing of such relationships should have yielded insight into the nature of language variation, into language learning and presumably also into language processing. But this was not happening. Few other languages, for example, exhibit a structural relationship between active and passive sentences which can be easily compared in its entirety to that holding between English active-passive pairs; even fewer form questions in anything like the English way. Far from shedding light on structural similarities and differences between languages and hence leading to an understanding of how a child could learn **any** language, this model treated each language as an isolated object, which the child had to learn piecemeal, coming equipped only with the basic tools for grammar construction. Although it was a significant advance on the ideas of the structuralists, transformational grammar, as a theory of language development, still left the child with far too much to do! To account for how language actually develops, a far richer model of acquisition was needed: it was necessary to suppose that the child comes equipped with -- and uses -- other, more powerful tools.

The change in perspective came in the mid to late seventies. Language learning began to be seen not as the discovery, by each child, for each language, of an independent set of rules or grammar for that language, but as a process in which the child unconsciously selects, on the basis of the language data around it, from among a relatively small number of alternatives, innately determined and available to every child. Individual words obviously have to be learned but they are learned by a process which involves fitting them into a more or less universal language structure which permits only very limited variation, and constrains even that variation to occur only along a relatively small number of parameters. The possibilities for variation are very highly constrained -- far more so, it turns out, than is suggested by the degree of superficial variation between languages. Much of that variation can now very plausibly be reduced to the **interaction of a small number of specific, abstract parameters along which languages, or sub-parts of languages can vary.** The parameters, the points at which languages can vary significantly, are available to every infant, being part of our inheritance as members of the human species -- either as a direct result of the human genotype or as a result of the interaction of this with constant factors in the environment.

Each child, in fitting the sounds which it encounters into the universally available framework, simply has to determine how the parameters must be set in order to analyze what it hears as a well-formed human language. Thus, what is important about an individual language is not the details of the grammar of that individual language, but the innately available parameters along which variation is possible. Given a language faculty constructed in something like this fashion, the human infant does not so much **learn** a language by forming and testing hypotheses; rather, it simply **develops** the language by setting a number of internal "switches" on the basis of the language data to which it is exposed. At each point where significant variation can occur, the child adopts that setting of a switch which, along with the settings for all the others, most easily permits the language data so far encountered to be structured into a maximally coherent system that is compatible with the framework as a whole. The values set at crucial points in structure have wide-ranging implications, interacting to yield the variation that can occur between actual languages.

And it is the invariant principles together with these "soft spots" -- the parameters along which variation is possible -- which constitute, according to this way of looking at language, a part of the core make-up of human beings: the equipment which enables us to develop language. It is these which make language so natural and inevitable a part of each individual human. It is these which define, in large measure, what it means to be an articulate mammal (with apologies to Jean Aitchison!)

Cognitive Linguistics in the Undergraduate Curriculum

With that as background, I can go on and, I think reasonably persuasively, show how linguistics can now play a pivotal role in the development of contemporary education -- a role which it could not play even a few years ago. During the sixties and seventies, linguists were indeed very wary of making any claims at all for the practical relevance of the field. Far more than non-linguists, they were aware of the very preliminary and limited nature of the theory they were using. It was not transformational linguists but English teachers and other potential users of linguistics who sometimes made exaggerated claims for the field. Chomsky's often quoted cautious remark in 1966 was typical of our (in retrospect quite appropriate) response to overtures from would-be consumers: "I am, frankly, rather skeptical about the significance for the teaching of languages of such insights and understanding as have been

attained in linguistics and psychology." (in Mark Lester, ed. Readings in Applied Transformational Grammar New York 1970, p. 54).

The recent developments in the field, sketched above, have totally altered the appropriateness of such a response to a similar question today. We can approach the problems of education confident of being able, at the very least, to assure our colleagues that results in the field, however tentative, **do** have significance for the teaching of languages. Our knowledge of how those languages relate to each other is different in kind from what it was in 1966, and even if it should turn out that that knowledge has little beyond descriptive validity, that alone is a very significant advance.

Whether the attempts that are now being made to develop research into aspects of second language acquisition within the new framework will lead to practical results remains to be seen. Personally I am cautiously optimistic. Theoretically driven research into first and second language acquisition is suddenly very promising. It could significantly change current approaches to language teaching and testing. Already, the pedagogical issues and the questions relating to the evaluation of language "competence" raised by such research are of considerable practical significance, whatever the ultimate level of success in applying the theory may be.

Even without such issues, which should be beginning to receive an airing in education and language departments throughout the country, the new model of language provides a real descriptive basis for fruitful interaction with -- and among --language departments, essentially for the first time. It could enable teachers and students of highly dissimilar languages to discover common ground and greatly enrich what is for many students a pretty sterile part of the curriculum: foreign language learning. Linguistic research now attempts to investigate not merely the structural relationships between the common European languages, but the properties that these languages have in common with Chinese, Japanese, Korean, the Bantu and other African languages, Finnish, the native American languages, Australian languages and so on. This alone is a highly important fact known to very few people indeed outside the field. Most outsiders still think of linguistics in terms of transformational grammar in the sense of **Aspects.** I don't need to tell **you** about the changes -- but we need to tell **them** -- because they simply do not know about them. To our non-linguist friends who have some acquaintance with our field, it is a highly complex, very formal successor to high school English. Such impressions will have to change. As we change them we will find that we are able to provide a focus for attempts to put language teaching on a new footing -- whether or not that

change can be based in part on the new theory-directed research into second language development.

Clearly it is not enough to argue that linguistics can now contribute significantly to the foundations of language teaching: alone, that cannot justify giving the field a place somewhere near the core of general education. Yet I believe there are good grounds for basing our case in the first instance on the way in which we can interact effectively with the traditional humanities, including modern language departments.

Linguistics, as it is now constituted, could very naturally extend its academic ties far beyond the traditional circle of anthropology, English and philosophy, allowing us to establish really meaningful relationships between fields as apparently disparate as the foreign and native languages, psychology, philosophy, computer science and, through evolutionary theory and ethology with biology and back again full circle with anthropology, enriching that field on a new level. Interestingly, meaningful contacts between such disciplines can be most easily established through a commitment to the development of the liberal arts curriculum.

Consider our status relative to biology. The ultimate theoretical underpinning of contemporary linguistic theory is the hypothesis that language development is driven by a species specific, innately determined property. Many questions suggest themselves in regard to the **evolution** of these human properties, and the relationship between innately determined aspects of language structure and innately determined animal behavior. Recent post-Darwinian developments in evolutionary theory provide a framework congenial to questions about the evolution of complex behavioral patterns like those involved in language. Many extremely interesting and important questions about the nature of humankind can be posed, and although actual scientific results may not be obtainable for many years, inter-disciplinary teaching in these areas at the undergraduate level could be exciting and (to students and faculty alike) profitable. Thus, at least on the undergraduate level, where questions like those I have just referred to are worth raising for their own sake, our links with evolutionary theorists are not fanciful.

Of course it is within the cognitive sciences that linguistics might be expected, a priori, to develop the closest ties. Recent advances in the understanding of vision, of conceptual structure, of reasoning, and of the structure and functioning of the brain itself, have much to tell us about the human species, much to tell us that could be linked systematically to linguistic results -- at least in the context of a liberal arts education. We all know, of

course, that for many reasons the ties between our field and the other cognitive sciences are in practice rather limited at the present time. Yet, as I have already implied, it seems quite likely that through a shared commitment to finding new approaches to education we will not find it hard to uncover much common ground with other cognitive scientists. The experience at Hampshire College, where linguistics is explicitly included in cognitive science, and flourishes, provides concrete evidence of how stimulating such an arrangement can be -- and mutually beneficial to linguistics, the other sciences, and the students.

If the recent advances in linguistics were of significance only to the extent that they built bridges between the natural and cognitive sciences and between these and the traditional humanities this would be reason enough to encourage more widespread introduction of the subject into the undergraduate curriculum. But there is also the subject matter -- and the methodology. The object of study is the human language faculty and the methodology is scientific. It is the potential inherent in this last point that to me is crucial. Linguistics courses can be effectively designed to teach scientific methodology to students with no background in science. It may be this above all which justifies giving the field a central position not only within the cognitive sciences but within the scientific component of a liberal education.

Courses designed to teach scientific method through linguistics are not simply abstract treatments of language structure. They begin with an examination of sentences in the students' own language and, taking these sentences as data, construct precise models of the language. The model is ultimately extended to cover variants of the language and to relate it structurally to other languages, including some that are superficially quite dissimilar from it. Questions of learnability can be made relevant: the analysis of language structure must be such as to yield a plausible account of what a child is engaged in when she or he is developing a native language. The reasoning is demanding. Precise deductions are made from rigorously formulated general hypotheses, and these are tested against facts drawn from the students' own language. The students start doing "real science" from the outset, and if they proceed beyond the basic course can quite rapidly approach current research questions, tackling carefully selected "cutting edge" literature after only a single course.

Despite the rigor of the reasoning, no background in mathematics as such is required, and linguistics demands neither apparatus nor laboratories -- nor the acquisition of those practical skills required to undertake laboratory research. Students with relatively little aptitude for formal work or abstract reasoning obviously find such courses difficult, but they don't need to find them

overwhelmingly so, and it is clear that many who would not be able to succeed in the kind of mathematics that is an essential prerequisite to serious work in most sciences can nevertheless follow, and indeed engage in such reasoning sufficiently well to profit from the attempt. On the level that is relevant to their development as educated human beings, they have practised scientific reasoning.

At the same time, they have been forced to consider their own language objectively, and have been freed, at least in some measure, from the highly subjective viewpoint from which they tend to consider all issues related to their own nature as human beings: they have viewed themselves as a part of nature. Since one's own language is so deeply felt as an expression of self, the experience of examining it objectively in this way has considerable educational value in and of itself.

Science majors taking linguistics courses often seem to benefit as much as any others since they discover (with some surprise) that it is possible to think in an essentially scientific manner about subject matter well beyond the confines of their own area of specialization -- and on issues concerning their own human identity. Moreover, in the course of their often very narrow, vocational, scientific training they seldom have the need (or ability) to tackle broader, philosophical issues of the sort that it is still quite easy in linguistics to bring up and to relate in detail to specific data. Far more than in any of the traditional sciences, and more even than in the other cognitive sciences, we can raise, as a normal part of teaching linguistics, questions about the subject matter and methodology of science and the nature of explanation, and similar, often quite deep philosophical questions.

Interestingly, the application of methods of rigorous argumentation to language may well have some very practical benefits, too. Traditionally Latin, and more recently various forms of logic and parts of mathematics, have been considered educationally beneficial, at least by some, not on account of their subject matter but because they force the students to engage in disciplined thinking, "habits" which might hopefully carry over to other areas. Careful, rigorous study of language structure forces us to think about our language. Not only does this confront the student immediately with a strikingly new, often disconcerting way of examining, objectively, phenomena which have hitherto seemed inalienably a part of the subjective self, but it permits the teacher wishing to do so to increase the students' sensitivity to important aspects of their own language and to the nature of argumentation. Hence, such courses should, in principle, be able to contribute very effectively to the writing program. My experiences as an editor make it quite clear that we would do well

to avoid trumpeting extravagant claims about the beneficial effects that linguistic study can have on writing skills! However (and it is a good thing to keep reminding ourselves of this!) the kinds of courses that would form a central part of a liberal education are not the kinds of courses we were subjected to as part of our vocational training as linguists. As part of a general education curriculum, linguistics may well be able contribute significantly to the students' ability to think systematically and to communicate effectively over a range of subjects.

Let me summarize: I believe that linguistics, taught explicitly as a part of the general education curriculum at the undergraduate level, can make a very significant contribution. It gives students, both those with majors in the traditional "humanities" and those in the sciences, insight into fundamental aspects of human nature. This it does by examining the important human abilities underlying language development and use. At the same time, when the methodology used is essentially scientific, as it can be even at the introductory level, it enables students to engage in scientific thinking that involves both creative imagination and rigorous hypothesis testing -- without requiring high-level mathematical preparation or skills. This essentially scientific thinking is applied to aspects of human nature itself and is in that sense deeply "humanistic"; at the same time, the very act of doing science introduces many students who would not otherwise have the opportunity, to one fundamental but neglected cornerstone of contemporary culture. Linguistics can form a bridge between many disciplines, and may, finally, contribute significantly to the ability of the students to use their own language effectively to shape and communicate their ideas.

Linguistics as a Major

So far I have simply dealt in very general terms with why -- and, by implication, how -- linguistics should form an important part of the general curriculum. I have not raised the question whether it can appropriately form an undergraduate major. To address that question effectively, will require that I be more practical. To counterbalance that I shall also have to say something about why (as far as I can see) we require undergraduates to take a major at all.

From a practical perspective, students specialize, and need to do so, in order to prepare them for what they take to be their future. Fortunately, they do

not always know just what that future will be, and the major is therefore, thank goodness, not justified by bread alone. In any case, quite aside from whatever mundane, practical, short-term reasons a student may give for following a particular major, the justification for having majors at all goes well beyond that of preparing students for specific careers: the major is, in some sense, the core and culmination of the undergraduate experience -- the focal point of a liberal education. It should embody the best of the ideals that drive our system, whatever practical goals it may also have.

Some majors represent the first rung on a ladder which, if all goes according to plan, the graduate will go on climbing, rung by rung, year after year. Many business and science degrees are of this nature, even when they are taken not as a preliminary to a career in the same field, but as a pre-professional degree. Early specialization is necessary in some areas. When the undergraduate experience is seen as principally vocational training of that sort, then linguistics cannot compete.

However, it would be a serious mistake to imagine, as many linguists have done even in the quite recent past, that a bachelors degree in linguistics is of no "use". Many, I believe most, of the UCLA linguistics undergraduates go to law school, for example, and many of those who don't do that go on to major in computer science at graduate school. A degree in linguistics is not simply for future linguists and other impractical dreamers, even if it hardly represents the first rung of the corporate ladder or the obvious route to a Nobel prize in chemistry. There are certainly many sought after majors which offer their graduates no better immediate prospects -- and a whole lot that offer them much worse.

But I don't want to say more about the immediate employment or academic prospects of graduates in linguistics. I want to return, instead, to my main theme: that linguistics has much of educational value to offer the undergraduate. Whatever the practical advantages or disadvantages of a linguistics major, there is little doubt that such a major is educationally sound. At one time, when linguistics was in effect a narrow branch of anthropology, isolated, with few obvious connections to any major area of human knowledge, and when the methodology was simplistic (though hardly simple!), then there was little if any justification for a major in the subject. The changes in the scope and outlook of the field, however, and the vast network of intellectual relations which it now has, or could have if one only took the trouble to seek them out, make it **one of the disciplines most obviously suited to study as an undergraduate major.**

In advanced undergraduate course-work, including senior seminars (or whatever device a college uses to integrate study in the major), the student can explore in depth, with great freedom, the implications of results that are very near the frontiers of research. More than any other field at the present time, linguistics forces the advanced undergraduate to engage in rigorous, systematic thinking within a more or less precisely determined framework, while at the same time, because so much is still exploratory, requiring both an extremely critical attitude towards results and an independent, imaginative and creative approach (within the paradigm) in order to obtain results. Of course, the very possibility of obtaining significant, original results during undergraduate work is itself virtually unique and certainly valuable. The undergraduate linguistics major who has graduated from a well-conceived program (and there are already a number of universities with excellent programs for majors) can hold his or her own in any company.

In a culture that is increasingly scientific, a world that is changing ever more rapidly, surely it makes sense, good hard practical sense, to encourage more and more of our undergraduates to take a major of this sort, based on rigorous, controlled, critical but independent creative thinking. Practical sense and educational sense too when the subject matter concerns one of the core aspects of human nature -- language.

Levels of Linguistics

I want to end with a very brief reference to some important implications of what I have said so far. To offer students the kind of educational experience that I have been talking about, we will need to change quite radically our thinking about course structure at the undergraduate level. We tend to think, implicitly, of three kinds of courses: the circus courses, the service courses, and the courses for majors and minors. And the kinds of courses we need to think about fall comfortably into none of those groups.

The circus courses (the one semester courses called something like "Introduction to Language") are no doubt important, but I am not talking about them. They are not designed -- or at least I know virtually none that are designed -- to introduce students to the kinds of issues or the kinds of thinking that I have been talking about today. They could be. In fact when I teach such courses, I insist on spending a good deal of the time doing precisely that. So I do some pretty hard syntax, and talk about parameters along with the birds and

the bees. But still, the contribution such courses can make to educational goals is limited.

For related reasons, I am also not concerned with service courses. Obviously most colleges with linguistics in some form have more than just the circus courses. But most of those are either intended for majors and minors or can be classified as "service" courses. These are generally intended to introduce Communications majors, language majors and so on, to some slightly more advanced facts and/or methodology that either we or their departments think might be useful to them. Service courses tend to be very practical, and it's rather common for the students to be reluctant and ill-prepared. In any case, they are of limited educational significance.

I am no longer dealing with courses for majors either -- or for minors, though they form part of the potential audience which my proposals are aimed at developing. If there were as many linguistics majors and minors as English has, we might be able to contribute significantly to the education of the next generation by concentrating on them. But there aren't that many and I don't foresee there being that many in the near future. We need a new kind of course.

Consider the situation in the traditional "humanities" disciplines. Having taken the introductory course, Art 100 or whatever, you do not need to be an art major to regard it as perfectly natural to go on and take courses on the impressionists, modernism, the Bauhaus. It is not unusual for non-English majors to decide to take Creative Writing or Advanced Rhetoric. Many students end up taking several philosophy or history courses that they don't have to, without thereby committing themselves to doing a minor in the field in question.

In my experience rather few students do this in linguistics -- and few departments actively encourage it by structuring their program appropriately. For there is a vast tract of uninhabited territory between the circus tent and the ivory tower. Between the 100 level course and the rest. Unless we offer the right kinds of courses, as well as persuading our colleagues that students should be taking such courses the situation will not change.

Robert Jeffers recently sent me information on a **two-course linguistics sequence** called "Introduction to the Study of Language" that is to be introduced into the general education curriculum at Rutgers. The first course deals with rather general issues: universals, social context, dialects and so on, while the second concentrates on psycholinguistics and theoretical analysis of language. It is obviously too soon to say how that proposal is going to work. But

it's on the right track. We need to develop several alternative sequences. We need lots of meaty, data based, theoretically informed courses, each of which on the one hand has students working with data and on the other has them thinking about the wider implications of what they are doing. Some should definitely be interdisciplinary, which could help to encourage students from other departments.

All those courses should build on a serious, well planned introductory course using lots of data to help the students discover how to build theory -- or better still a sequence of courses. The course(s) should dig deeply enough into the field to give the students a clear idea of how to think effectively about language. Yet they most definitely must not imply (as do so many of our more advanced undergraduate courses) that the students have to adopt the values and interests of professional linguists in order to make sense of the endeavor. Explicitly, such courses need to be set up as a part of general education. They will use appropriately selected material from the professional linguistic literature as well as drawing on the students' own knowledge of language. But, as linguists, we will have to continually steer ourselves away from theory for its own sake and towards an approach in which the gaining of insight into the nature of human language is -- and is very obviously seen to be -- the focus, while linguistic theory is clearly no more than the means to that end.

This idea will have to be sold to colleagues and administrators. It will obviously have to be built up slowly. Courses need teachers; teachers don't come on the payroll without students. And students don't come without courses to walk into. (As linguists we are quite used to dealing with vicious circles!) The first step is to start believing in what we are doing -- or even more basically: to be quite sure what it is that we are doing. And then to treat that circle as a spiral.

I am perfectly sure there are already many people who are implicitly and some who are quite explicitly trying to justify and develop programs along the lines outlined here. The recent changes in our field and the educational needs of the country make it inevitable that linguists should become involved in education. My purpose, in this paper, has been to try and articulate what it is that we may be trying to do, in the hope that that will help us move along just a little faster and with a little more confidence.

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